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A Dietary Synopsis of *Nerodia rhombifer*, including a Novel Prey Item

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The diamondback water snake, *Nerodia rhombifer* (Hallowell, 1852), is a large, New World natricine occurring in the Upper Mississippi and Lower Illinois Rivers through the Great Plains and along the Gulf Coast of Mexico into Campeche (Gibbons and Dorcas, 2004). As an aquatic specialist, *N. rhombifer* is decidedly piscivorous, but occasionally consumes non-fish prey as well (Ernst and Ernst, 2003). We constructed a comprehensive list of the prey species recorded for *N. rhombifer* by compiling multiple records from the literature dating as far back as 1937 (Table 1). Additionally, we report a previously unrecorded prey species from a *N. rhombifer* specimen in the Illinois Natural History Survey (INHS) Herpetology Collection.

We examined two *N. rhombifer* specimens collected from the Horseshoe Lake Conservation Area in Alexander County, Illinois, from the Southern Illinois University Carbondale Herpetology Collection (SIUC), which have since been accessioned into the INHS Herpetology Collection. The first specimen, a gravid female *N. rhombifer* (818 mm SVL, 1046 mm TTL; INHS 31273, formerly SIUC R-3151) was collected on 6 April 1995 by Allan K. Wilson and M. R. Janssen. The snake was found dead with a spotted gar (*Lepisosteus oculatus*; 133 mm standard length, 159 mm total length, 16 mm body depth, 42 mm girth) protruding from its mouth after attempting to ingest the prey tail-first (Figure 1). The second specimen, a male (712 mm SVL, 917 mm TTL; INHS 31322, formerly SIUC R-2946) was collected on 17 July 1996 by M. A. Heafner and Allan K. Wilson after regurgitating a partially digested shortnose gar (*Lepisosteus platostomus*; 204 mm standard length, 240 mm total length, 19 mm body depth, 70 mm girth). The shortnose gar, previously unreported as a prey item for *N. rhombifer*, had evidently been ingested head-first as the anterior portion of the fish was further digested than the posterior portion (Figure 2).

Previous studies on the feeding ecology of *N. rhombifer* demonstrate that fish can constitute up to 98.5% of the volume of food ingested (Hess and Klimstra, 1975) and 97% of the prey items ingested (Kofron, 1978). Most fish prey taken by *N. rhombifer* are slow swimmers (Ernst and Ernst, 2003), so the quick and agile nature of *Lepisosteus* spp. likely makes their capture difficult. Indeed, only three previous records exist for gar predation by *N. rhombifer*, all of them being spotted gar (*L. oculatus*; Perkins and Eason, 2017). The two gar specimens that we examined were both juveniles, which would have made them more susceptible to capture by *N. rhombifer*.

The vast majority of the recorded prey species for *N. rhombifer* are fishes, but at least eight amphibian species, two reptile species, one bird species, two mammal species, and ten invertebrate species have been recorded as prey items. However, the details regarding some of these unusual predation events are unfortunately vague or simply unknown. Hess and Klimstra (1975) discovered bat teeth (Order: Chiroptera) in the intestine of a *N. rhombifer* and speculated that the snake may have consumed a bat which had fallen in the water, but they were unable to obtain a more specific identification. Sisk and McCoy (1963) discovered feathers and eggshells in the gastrointestinal tract of one *N. rhombifer* and Clark (1949) reported 11 unidentified birds (unverified) as prey. However, the validity of Clark (1949) has been questioned due to the lack of physical evidence, the secondhand nature of the article itself, and other numerous discrepancies that cast doubt (see Gibbons and Dorcas, 2004),

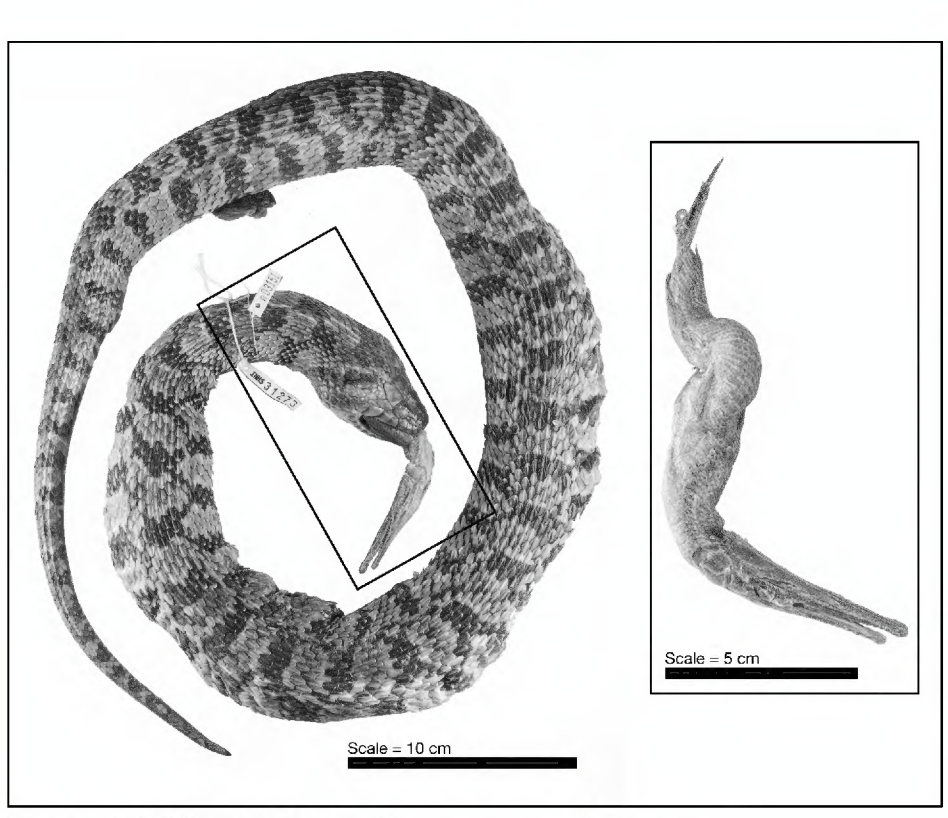

Figure 1. INHS 31273 with *Lepisosteus oculatus* prey.

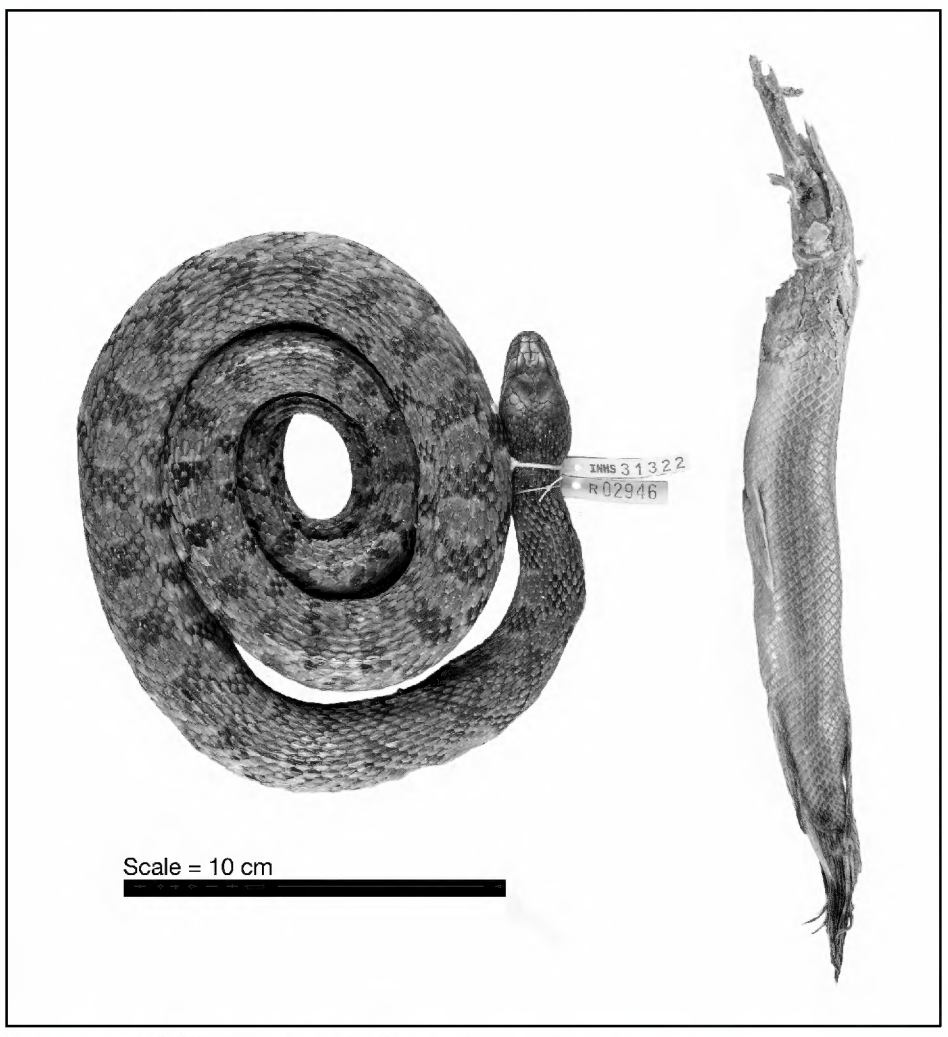

Figure 2. INHS 31322 with *Lepisosteus platostomus* prey.

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therefore it should be cited with caution. Other unique prey items such as the salamander (Greding, 1964) and snake (Sisk and McCoy, 1963) were never identified to the specific level, and equally, many of the invertebrate prey items lack identifications beyond the order or family level. In most cases, these details are lost and specific community interactions cannot be parsed any further.

Moreover, taxonomic revisions have also impeded specific prey identifications. Bowers (1966), for instance, reported *Bufo woodhousei fowleri* (*sensu lato*) as prey from an intergrade zone between *Anaxyrus woodhousii* and *A. fowleri*, so we are forced to leave this record ambiguous. Similarly, Carpenter (1958) as well as Sisk and McCoy (1963) report *Rana pipiens* (*sensu lato*) as prey in Oklahoma where *Lithobates blairi* and *L. sphenocephalus* could be sympatric. Since other authors have included *L. blairi* in their prey lists (Ernst and Ernst, 2003; Gibbons and Dorcas, 2004), we have also included it, but highlight its associated uncertainty. In essence, instances of non-fish predation should be investigated with the utmost detail in order to understand the circumstances under which *N. rhombifer* resorts to consuming these less preferred prey items.

Table 1. List of documented prey items for *Nerodia rhombifer*.

Prey Identity	**Common Name**	**Sources**
Fishes		
Ameiurus sp.	Bullheads	Preston, 1970
Ameiurus melas	Black Bullhead	Laughlin, 1959; Sisk & McCoy, 1963; Kofron, 1978
Ameiurus natalis	Yellow Bullhead	Sisk & McCoy, 1963; Bowers, 1966
Anguilla rostrata	American Eel	Mushinsky & Hebrard, 1977; Kofron, 1978
Aphredoderus sayanus	Pirate Perch	Perkins & Eason, 2017
Aplodinotus grunniens	Freshwater Drum	Kofron, 1978
Astyanax fasciatus	Banded Astyanax	Aldridge et al., 2003
Bagre marinus	Gafftopsail Catfish	Kofron, 1978
Carassius auratus	Goldfish	Clifton et al., 2017
Carpiodes carpio	River Carpsucker	Sisk & McCoy, 1963
Cathorops aguadulce	Estuarine Sea Catfish	Aldridge et al., 2003
Cichlasoma sp.	Cichlids	Aldridge et al., 2003
Cichlasoma urophthalmus	Mayan Cichlid	Aldridge et al., 2003
Ctenogobius shufeldti	American Freshwater Goby	Kofron, 1978
Ctenopharyngodon idella	Grass Carp	Clifton et al., 2017
Cynoscion arenarius	Sand Seatrout	Kofron, 1978
Cyprinodon variegatus	Sheepshead Pupfish	Kofron, 1978
Cyprinus carpio	Common Carp	Sisk & McCoy, 1963
Dormitator maculatus	Fat Sleeper	Manjarrez & Macías Garcia, 1991; Aldridge et al., 2003
Dorosoma sp.	Shad	Cagle, 1937; Mushinsky & Hebrard, 1977
Dorosoma cepedianum	American Gizzard Shad	Hess & Klimstra, 1975; Kofron, 1978
Elassoma zonatum	Banded Pygmy Sunfish	Mushinsky & Hebrard, 1977; Kofron, 1978
Fundulus sp.	Topminnows	Mushinsky & Hebrard, 1977; Kofron, 1978
Fundulus grandis	Gulf Killifish	Kofron, 1978
Fundulus notatus	Blackstripe Topminnow	Hess & Klimstra, 1975
Gambusia affinis	Western Mosquitofish	Bowers, 1966; Hess & Klimstra, 1975; Mushinsky & Hebrard, 1977; Kofron, 1978
Heterandria formosa	Least Killifish	Mushinsky & Hebrard, 1977
Family: Ictaluridae	Catfish	Cagle, 1937; Clark, 1949; Laughlin, 1959; Hess & Klimstra, 1975; Mushinsky & Hebrard, 1977, Gibbons & Dorcas, 2004
Ictalurus furcatus	Blue Catfish	Kofron, 1978; Lazcano-Villareal et al., 2010
Ictalurus punctatus	Channel Catfish	Sisk & McCoy, 1963; Kofron, 1978; Lazcano-Villareal et al., 2010; Clifton et al., 2017
Lepisosteus oculatus	Spotted Gar	Perkins & Eason, 2017; this study
Lepisosteus platostomus	**Shortnose Gar**	**This study**
Lepomis sp.	Sunfish	Cagle, 1937; Carpenter, 1958; Sisk & McCoy, 1963; Bowers, 1966; Hess & Klimstra, 1975; Mushinsky & Hebrard, 1977
Lepomis cyanellus	Green Sunfish	Kofron, 1978
Lepomis punctatus	Spotted Sunfish	Laughlin, 1959

Table 1 (cont'd).

Prey Identity	Common Name	Sources
Lucania parva	Rainwater Killifish	Kofron, 1978
Menidia audens	Mississippi Silverside	Hess & Klimstra, 1975
Micropterus sp.	Black Bass	Webb, 1970; Hess & Klimstra, 1975; Kofron, 1978
Micropterus punctulatus	Spotted Bass	Kofron, 1978
Micropterus salmoides	Largemouth Bass	Sisk & McCoy, 1963; Kofron, 1978
Morone chrysops	White Bass	Hess & Klimstra, 1975
Morone saxitilis / chrysops	Striped Bass	Clifton et al., 2017
Mugil sp.	Mullet	Kofron, 1978
Mugil cephalus	Flathead Gray Mullet	Kofron, 1978
Mugil curema	White Mullet	Kofron, 1978
Notemigonus crysoleucas	Golden Shiner	Laughlin, 1959; Sisk & McCoy ,1963; Kofron, 1978
Notropis sp.	Eastern Shiners	Sisk & McCoy, 1963
Noturus nocturnus	Freckled Madtom	Farr & Caraviotis, 2014
Oreochromis aureus	Blue Tilapia	Aldridge et al., 2003; Zamora & Valdez, 2007
Pimephales promelas	Fathead Minnow	Plummer & Goy, 1984
Poecilia sp.	Mollies	Mushinsky & Hebrard, 1977
Poecilia latipinna	Sailfin Molly	Kofron, 1978
Poecilia mexicana	Shortfin Molly	Manjarrez & Macías Garcia, 1991; Aldridge et al., 2003
Pomoxis sp.	Crappie	Hess & Klimstra, 1975
Pylodictis olivaris	Flathead Catfish	Sisk & McCoy, 1963
Rhamdia guatamalensis	Pale Catfish	Aldridge et al., 2003
Amphibians		
Anaxyrus sp.	Toad	Bowers, 1966; Byrd et al., 1988
Hyla chrysoscelis	Cope's Gray Treefrog	Palis, 2014
Hyla cinerea	Green Treefrog	Bowers, 1966
Leptodactylus melanonotus	Black Jungle Frog	Manjarrez & Macías Garcia, 1991
*Lithobates blairi**	Plains Leopard Frog	Carpenter, 1958; Sisk & McCoy, 1963
Lithobates catesbeiana	American Bullfrog	Sisk & McCoy, 1963; Bowers, 1966,
Lithobates clamitans	Green Frog	Clark, 1949; Bowers, 1966; Kofron, 1978
Lithobates sp.	True Frogs	Mushinsky & Hebrard, 1977
Lithobates sphenocephalus	Southern Leopard Frog	Clark, 1949; Plummer & Goy, 1984
Order: Caudata	Salamander	Greding, 1964
Reptiles		
Chelydra serpentina	Common Snapping Turtle	Cagle, 1937
Suborder: Serpentes	Snake	Sisk & McCoy, 1963
Birds		
Class: Aves*	Bird	Clark, 1949; Sisk & McCoy, 1963
Mammals		
Order: Chiroptera*	Bat	Hess & Klimstra, 1975
Sigmodon hispidus	Hispid Cotton Rat	Sisk & McCoy, 1963
Invertebrates		
Procambarus sp.	Crayfish	Bowers, 1966
Procambarus clarki	Red Swamp Crayfish	Kofron, 1978
Palaemonetes sp.	Shrimp	Kofron, 1978
Palaemonetes paludosus	Riverine Grass Shrimp	Kofron, 1978
Macrobrachium acanthurus	Cinnamon River Shrimp	Aldridge et al., 2003
Order: Coleoptera	Beetles	Bowers, 1966
Suborder: Epiprocta	Dragonflies	Sisk & McCoy, 1963
Suborder: Zygoptera	Damselflies	Kofron, 1978
Caelifera sp.	Grasshoppers	Sisk & McCoy, 1963; Kofron, 1978
Family: Chironomidae	Midges	Hess & Klimstra, 1975
Family: Corixidae	Water Boatmen	Hess & Klimstra, 1975

Table 1 (cont'd).

Prey Identity	Common Name	Sources
Family: Culucidae	Mosquitoes	Hess & Klimstra, 1975
Order: Achatinoidea	Snails	Hess & Klimstra, 1975

* See text for explanation.

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Notes on Reproduction of Western Narrow-mouthed Toads, *Gastrophryne olivacea* (Anura: Microhylidae) from Texas

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Abstract

Data is presented from a histological examination of gonads from 36 western narrow-mouthed toads, *Gastrophryne olivacea*, from Texas. The two smallest mature males (sperm in lumina of seminiferous tubules) measured 26 mm SVL and were from May and August. The smallest mature female (spawning condition) measured 24 mm SVL and was from February. In Texas, both sexes of *Gastrophryne olivacea* are capable of reproducing from February into August. It is postulated that non-spawning in some females collected from February to April may have resulted from insufficient winter–spring rainfall to trigger reproduction.

Gastrophryne olivacea (Hallowell, 1856) ranges from southern Nebraska, through central Missouri, Oklahoma, Texas to the Mexican states of Chihuahua, Durango, Tamaulipas and San Luis Potosí (Frost, 2018). *Gastrophryne olivacea* activity occurs throughout the warm season but may be curtailed by drought (Dodd, 2013). Breeding occurs during rainfall in spring and early summer (Elliot et al., 2009). lnformation on the ovarian cycle of *G. olivacea* in Kansas is in Freiburg (1951). The biology of *G. olivacea* is summarized in Nelson (1972) and Sredl and Field (2005). In this paper I present data from a histological examination of *G. olivacea* gonadal material from Texas. Utilization of museum collections for obtaining reproductive data avoids removing additional animals from the field.

A sample of 36 *Gastrophryne olivacea* collected 1959 to 2009 in Texas consisting of 15 adult males (mean snout–vent length, SVL = 27.9 mm ± 1.5 SD, range = 26–31 mm) and 21 adult females (mean SVL = 27.8 mm ± 3.8 SD, range = 20–33 mm) was examined from the Biodiversity Research and Teaching Collection (TCWC), Texas A&M University, College Station, Texas, USA. An unpaired *t*-test was used to test for differences between adult male and female SVLs (Instat, vers. 3.0b, Graphpad Software, San Diego, CA).

A small incision was made in the lower part of the abdomen and the left testis was removed from males and a piece of the left ovary from females. Gonads were embedded in paraffin. Sections were cut at 5 μm and stained with Harris' hematoxylin followed by eosin counterstain (Presnell and Schreibman, 1997). Histology slides are deposited at TCWC.

There was no significant difference between mean SVL of adult males versus adult females of *G. olivacea* ($t = 0.12$, df = 34, $P = 0.91$). The testicular morphology of *G. olivacea* is similar to that of other anurans as described in Ogielska and Bartmańska (2009a). Within the seminiferous tubules, spermiogenesis occurs in cysts which remain closed until the late spermatid stage is reached; cysts then open and differentiating sperm reach the lumina of the seminiferous tubules (Ogielska and Bartmańska, 2009a). All examined males were undergoing spermiogenesis (= sperm formation); lumina of the seminiferous tubules contained bundles of sperm. *Gastrophryne olivacea* males were from the following months: February ($n = 2$), March ($n = 1$), April ($n = 2$), May ($n = 2$), June ($n = 2$), July ($n = 4$), August ($n = 2$). The smallest mature males (spermiogenesis) in my study measured 26 mm SVL and were from May (TCWC 94117) and August (TCWC 79893). Wright and Wright (1949) reported adult *G .olivacea* males were between 20–33 mm SVL.

The ovaries of *G. olivacea*, typical of other anurans, are paired organs lying on the ventral sides of the kidneys, and containing diplotene oocytes in various stages of development (Ogielska and Bartmańska, 2009b). Mature oocytes are filled with yolk droplets; the layer of surrounding follicular cells is thinly stretched. Two stages were present in the spawning cycle (Table 2); (1) "Ready to spawn" in which mature oocytes predominated; (2) "Not in spawning condition" in which early diplotene oocytes predominated. Females in spawning condition were found from February to August, one month earlier than in Tipton et al. (2012) who reported that Texas *G. olivacea* commenced reproduction in March. The presence of some *G. olivacea* non-spawning females in my samples from February to April (Table 1), may suggest winter–spring rainfall was insufficient to stimulate reproduction. The smallest spawning female in my sample measured 24 mm SVL (TCWC 20291) and was from February. Wright and Wright (1949) reported *G. olivacea* adult females as being 19–38 mm SVL.

Atresia is a widespread process occurring in the ovaries of all vertebrates (Uribe, 2009). It is common in the amphibian ovary

Table 1. Two monthly stages in the spawning cycle of 21 adult female *Gastrophryne olivacea* from Texas.

Month	N	Ready to spawn	Not in spawning condition
January	1	0	1
February	3	1	2
March	5	2	3
April	2	1	1
May	2	2	0
June	2	2	0
July	1	1	0
August	3	3	0
September	1	0	1
October	1	0	1

Table 2. Times of breeding by state for *Gastrophryne olivacea*.

State	Times of breeding	Source
Kansas	May, June, August	Fitch, 1956
Kansas	late April to late September	Collins et al., 2010
Missouri	late May to early July	Johnson, 2000
Nebraska	begins in late April	Fogell, 2010
Oklahoma	late April to September	Bragg, 1943
Texas	March to September	Tipton et al., 2012

(Saidapur, 1978) and is the spontaneous digestion of an oocyte by its own hypertrophied and phagocytic granulosa cells which invade the follicle and eventually degenerate after accumulating dark pigment (Ogielska and Bartmańska, 2009b). Atresia was noted in 2/12 (17%) of spawning *G. olivacea* females. Two non-spawning *G. olivacea* females, one from March (TCWC 30922), one from April (TCWC 30925) contained yolking oocytes comparable to "Secondary growth stage 5" (Uribe, 2011). It was not possible to ascertain when these females might spawn.

Times of breeding for *G. olivacea* in other states are in Table 2. *Gastrophryne olivacea* reproduction typically commences in spring and continues into summer. Considering other congeners from the United States, *Gastrophryne carolinensis* inhabit the southeastern and lower midwestern United States; southern populations reproduce from March to October whereas northern populations have a shorter period of reproduction (Mitchell and Lannoo, 2005). In contrast, *Gastrophryne mazatlanensis*, which is known from south-central Arizona to Jalisco, Mexico, breeds during the summer monsoon period in southern Arizona (Murphy, 2018).

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Appendix

Thirty-six *Gastrophryne olivacea* examined by county from Texas borrowed from the Biodiversity Research and Teaching Collection (TCWC), Texas A&M University, College Station, Texas, USA.

Anderson TCWC 29122; **Archer** TCWC 75112; **Bastrop** TCWC 95687; **Bexar** TCWC 78946; **Brazos** TCWC 14459, 14461, 84167, 92035; **Brewster** TCWC 20147, 88025, 88026, 88028, 93529; **Brown** TCWC 75118; **Clay** TCWC 75083; **Cooke** TCWC 30922; **Crockett** TCWC 100364; **Fisher** TCWC 93944, 94005, 94006; **Hays** TCWC 38702; **Irion** TCWC 94116, 94117; **Jeff Davis** TCWC 26046, 26049; **Kinney** TCWC 83945; **Maverick** TCWC 80590; **Parker** TCWC 87105, 87107; **Real** TCWC 79893; **San Patricio** TCWC 20291, 20293; **Waller** TCWC 14687; **Washington** TCWC 30925; **Webb** TCWC 80110; **Wichita** TCWC 77831.

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Notes on the Herpetofauna of Western Mexico 20: A New Food Item for *Masticophis mentovarius* in the Municipality of Teuchitlan, Jalisco, Mexico

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Abstract

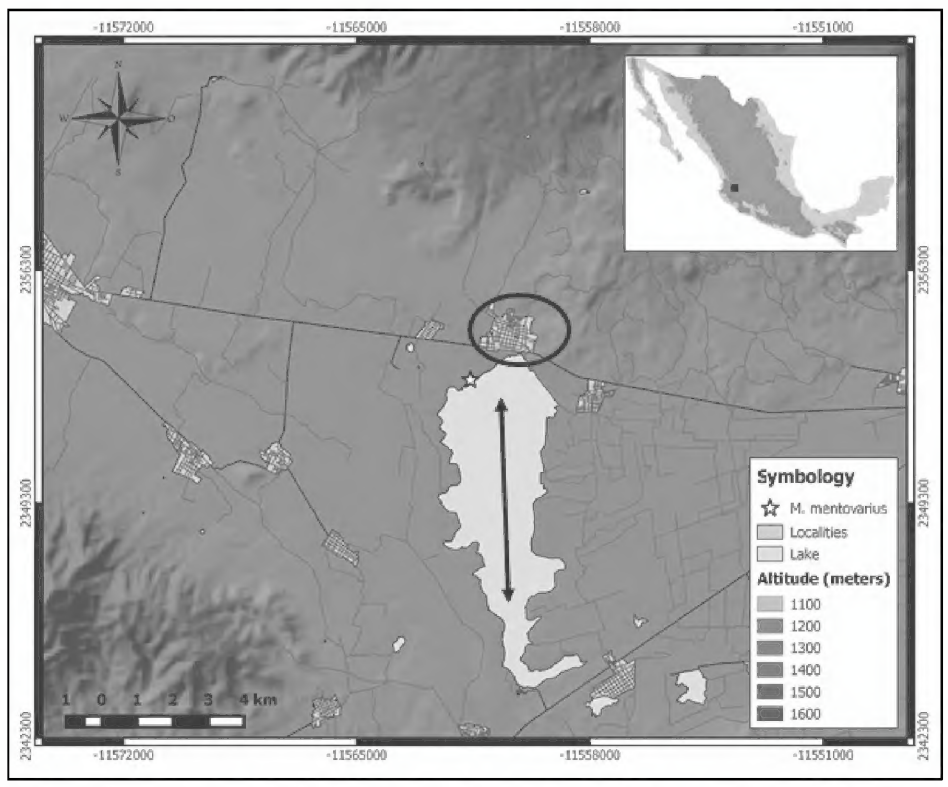
We document for the first time predation by a Neotropical whipsnake (*Masticophis mentovarius*) on an eastern cottontail (*Sylvilagus floridanus*). The event took place in the vicinity of Teuchitlan, Jalisco, Mexico, on 23 May 2018 at 16:36 h. The locality supports heavily disturbed deciduous medium tropical forest near a dam.

Resumen

Se documenta por primera vez el consumo de un Conejo Castellano (*Sylvilagus floridanus*) por una chicoteadora (*Masticophis mentovarius*). El evento tuvo lugar en la localidad de Teuchitlán, Jalisco el 23 de mayo a las 16:36 h. El lugar que es un bosque tropical mediano caducifolio cerca de una presa está fuertemente perturbado.

During the course of a herpetological survey in the municipality of Teuchitlan, Jalisco (20° 40' 24.76"N, 103° 51' 34.16"W, WGS 84; elevation 1264 m), 15–26 May 2013, we observed a *Masticophis mentovarius* (Neotropical whipsnake / *Chicoteadora*) consuming a *Sylvilagus floridanus* (eastern cottontail / *conejo castellano*) beneath an *Acacia farmeciana* (sweet acacia / *huizache*) (see photographic sequence on following page). The event was observed on 23 May at 16:36 h. The snake took 15 minutes to consume the prey. The area where the event took place is an introduced grassland with some acacia elements in between sugarcane plantations; we also observed some small patches of what's left of the tropical deciduous forest beside the lake created by a dam (see map below).

Jalisco's geographic location in Mexico, together with its variety of topographic, orographic, and climate characteristics provides an extensive range of habitats that contribute to its impressive biological diversity. The state's herpetological richness is one of the most significant in the country, based on Flores-Villela (1993a), and yet even with the participation of many other authors (Smith and Grant, 1958; Grant and Smith, 1960; Tanner and Robison, 1960; Dixon, 1963; Dixon and Webb, 1965; Smith and Taylor, 1966; Hensley and Lannom, 1966; Dixon, 1968; Medica et al., 1975; Campbell, 1978; Casas-Andreu, 1982; Méndez-de la Cruz and Casas-Andreu, 1992; Flores-Villela, 1993b; Flores-Villela and Gerez, 1994; García and Ceballos, 1994; Ramírez-Bautista, 1994; Flores-Villela et al., 1995; Berry et al., 1997; Ponce-Campos et al., 2001; Riojas-López and Mellink, 2006; Reyna-Bustos et al., 2007; Cruz-Sáenz et al., 2008; Cruz-Sáenz et al., 2009; Santiago-Pérez et al., 2012; Rodríguez-Canseco and Quiroz, 2013; Barragán-Ramírez et al., 2014; Carbajal-Márquez et al., 2015; Chávez-Ávila et al., 2015; Cruz-Sáenz et al., 2015), there is still an enormous amount of work to accomplish on the inventory and conservation of this herpetodiversity.



Area where the predation event indicated by the star took place. The ellipse surrounds the town of Teuchitlan, Jalisco, Mexico. The double-ended arrow indicates the lake (Presa La Vega) created by a dam.

The state of Jalisco is located in western Mexico and has a surface area of 78,890 km^2. Its geographic position places it in two biogeographic regions, the Nearctic and the Neotropical. Within the state limits, there are four physiographic provinces, Sierra Madre Occidental, Neovolcanic Axis, Sierra Madre del Sur, and Central Plateau, according to INEGI (1981) and Chávez-Ávila et al. (2015), but recently Cruz-Sáenz et al. (2017) recognized seven physiographic regions for the state: Pacific Coastal Plain (PC); Sierra Madre Occidental (SO); Sierras Jaliscienses (SJ); Trans-Mexican Volcanic Belt (TV); Sierra de Coalcomán (SC); Central Plateau (CP); Tepalcatepec Depression (TD). The conjunction of these provinces and the very irregular orography allows a wide variety of climates, vegetation types, and biological diversity to emerge.

As a result of diverse environmental conditions and habitats, Jalisco harbors 13 different vegetation types according to Rzedowski (2006), including the following: *palmar* (palm trees); *bosque tropical subcaducifolio* y *caducifolio* (tropical

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A Neotropical whipsnake (*Masticophis mentovarius*) consuming a baby eastern cottontail (*Sylvilagus floridanus*) in the vicinity of Teuchitlan, Jalisco, Mexico, 23 May 2013.

subdeciduous and deciduous forest); *bosque espinoso* (thorn scrub forest); *matorral subtropical* (subtropical matorral); *vegetación sabanoide* (coastal grasslands); *zacatal* (pasture); *matorral rosetófilo crasicaule* (succulent rosette scrub); *bosque de pino-encino* (pine-oak forest); *mesófilo de montaña* (montane mesophyllic forest); *bosque de oyamel* (oyamel fir forest); *vegetación semiacuática y acuática* (aquatic and subaquatic vegetation), and *manglar* (mangrove forest).

Background: the municipality of Teuchitlan, Jalisco

The sampling locality in the municipality of Teuchitlan is in the Trans-Mexican Volcanic physiographic region (Cruz-Sáenz et al., 2017). The municipality has an an area of 285.53 km^2, and lies between 20°33'50" and 20°47'40"N latitude and between 103°47'30" and 103°51'20"W longitude, with an average altitude of 1300 m. Flat areas of the municipality account for 40% of the territory. There are few hilly areas making up 4% of the territory. An important landmark in the northern portion of the municipality is Volcán de Tequila, one of the most striking orographic sights in the state. More than half of the municipality's territory (56%) is formed by semi-plains areas, with small elevated hills (Anonymous, 1988).

Background: *Masticophis mentovarius*

The common name for *Masticophis mentovarius* is Neotropical whipsnake / *chicoteadora*. This is a large snake reaching up to 2100 mm in total length, with the tail representing 25% of the total length. The head is distinct from the neck; the large eyes have round pupils. Other features are 19-17-13 rows of smooth dorsal scales, occasionally 19-15-13, with apical pits; ventral scales 195 to 196; cloacal scute and subcaudals divided, supralabials 7 (rarely 8), the 4th and 5th in contact with the orbit; infralabials 10; preoculars 2; postoculars 2; loreals 1 or 2; temporals 2 + 2 or 2 + 3; anterior and posterior chin shields of the same size.

The dorsal coloration, including head and tail, is uniform—light brown to dark brown—and may extend to the venter. The ventral scales on the anterior section of the body are yellow, grading posteriorly to light cream. Parts of the head are yellow to gray, and the supralabials are yellow. This color pattern can vary depending on locality.

Masticophis mentovarius is present in the Mexican states of Sonora, Sinaloa, Nayarit, Jalisco, Colima, Durango, Zacatecas, Aguascalientes, Michoacán, Guerrero, Morelos, Puebla, and Oaxaca (O'Connell and Smith, 2018). Recently it has been reported for the state of Quintana Roo (Cedeño-Vázquez and Beulterspacher-García, 2018).

Masticophis mentovarius is mainly terrestrial, most abundant in the coastal plain and other areas of low altitude. Suitable habitat includes humid forest, savannas, beaches, edges of thorn scrub and deciduous forests, and also mangroves (Lee, 2000; Campbell, 1998). It is recognized that the species preys on a wide variety of vertebrates: frogs, lizards, snakes, turtles, juvenile birds and rodents (Ernst and Ernst, 2003; Werler and Dixon, 2000). Solórzano (2004) and Pérez-Higareda et al. (2007) reported that this species feeds on lizards of the genera *Holcosus*, *Aspidoscelis*, *Ctenosaura* and *Sceloporus* in addition to snakes and birds. Another study on the food habits of *M. mentovarius* in Brazil found in the stomach contents a specimen of *Leptodactylus andreae* (lowland tropical bullfrog / *ranita de la hojarasca*) (Bernarde and Abe, 2010). Calderon-Patron et al. (2011) reported on a male of the species that had consumed *Tlacuatzin canescens* (grayish mouse opossum / *tlacuache*). A study by Altamirano-Alvarez et al. (2012) in the municipality of Alvarado, Veracruz, reported *Sylvilagus cunicularius* (Mexican cottontail / *conejo de monte*) in the diet of *M. mentovarius*, also mentioning that they feed on rodents, without giving any specifics. A study conducted on food habits of the endangered *Lepus flavigularis* (Tehuantepec jackrabbit / *liebre de Tehuantepec*),

discovered that the main predator of the species was *M. mentovarius* (Luna-Casanova et al., 2016). Bello-Sánchez et al. (2016) reported a specimen of *M. mentovarius* eating *Anolis sericeus* (silky anole / *abaniquillo punto azul*).

The Spanish common name, *chicoteadora*, for *Masticophis mentovarius* comes from the strong and repeated whiplike strokes that it launches with its body and tail when it is held by the neck. It reproduces by eggs, gravid females are found in dry season from April to May, clutch size 16–30 eggs (Lee, 2000). The species has aglyphous teeth and does not present a danger to humans (Solórzano, 2004; Pérez-Higareda et al., 2007)

Background: *Sylvilagus floridanus*

Sylvilagus floridanus is referred to commonly as the eastern cottontail / *conejo castellano*. This rabbit is a large species for the genus. Its fur is long and dense, from brown to gray on the back and white on its belly, including tail (Ceballos and Galindo, 1984; Feldhamer et al., 2003). Due to the wide distribution of this species, diagnostic features vary according to the locality; in local areas, however, it is usually easy to distinguish it from other rabbits that live in the same place (Chapman et al., 1980). The geographical distribution is the most extensive of any member of the genus *Sylvilagus.* This species occurs from southern Canada to central and northwestern South America, including the islands of northern Venezuela. This rabbit has been introduced widely in North America and Europe. In Mexico it is found almost throughout with the exceptions of the Baja California peninsula, the northern part of the Mexican Plateau and the eastern portion of the Yucatán peninsula (Ceballos and Galindo, 1984; Dowler and Engstrom, 1988; Ramírez-Pulido et al., 1986; Feldhamer et al., 2003). *Sylvilagus floridanus* inhabits many types of vegetational communities in valleys, plains, and mountains in oak, pine, tropical, xerophytic forests, and grasslands (Chapman and Ceballos, 1990; Nelson, 1907, 1909); it ranges in altitude from sea level to approximately 3200 masl (Davis, 1944; Chapman et al., 1980). Commonly, it is seen in cleared natural grasslands and agricultural land. When threatened, it takes refuge in undergrowth or in scrub vegetation. The diet consists of a wide variety of grasses, herbs, seedlings, vegetables, fruits, and grains. Tender shoots are eaten selectively, so it is common to see it at certain times in fields during sowing seasons. This rabbit is an important link in trophic chains because it is preyed upon by many vertebrates, such as birds of prey, crows, weasels, raccoons, coyotes, foxes, ringtails, bobcats, and rattlesnakes (Ceballos and Galindo, 1984; Feldhamer et al., 2003).

Discussion and conclusion

As mentioned above, *M. mentovarius* is an opportunistic predator. The wide distribution of this snake in Mexico in many vegetation communities and over a wide altitude range places it in contact with an extensive variety of prey items. So, here we document for the first time the consumption of another species of *Sylvilagus*. No data on either of the species involved was taken, in order not to disturb the encounter. The snake was just photographed and allowed to continue its daily activities.

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Book Review: *The Book of Snakes: A Life-size Guide to Six Hundred Species from around the World*

by Mark O'Shea

2018. 656 pp. The University of Chicago Press. Hardbound, cloth or E-book. $55.00 or less*

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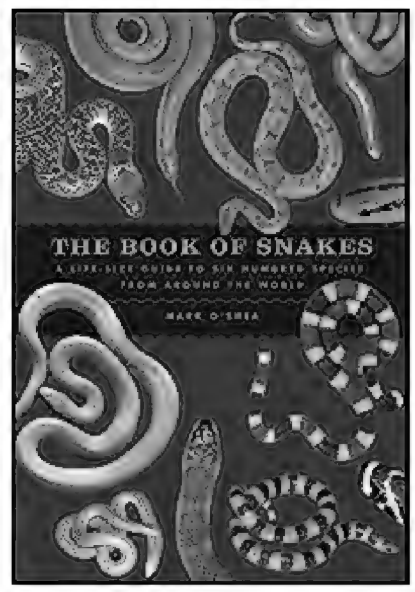
Mark O'Shea is a well-known British herpetologist, author, and natural history television personality. His new book, *The Book of Snakes: A Life-Size Guide to Six Hundred Species from around the World*, is a thick volume that is heavy on images, with 2,400 color plates, and light on text. While no book could depict all 3,700 described snake species, 600 is an uncommonly large number for one publication. O'Shea gives us a broad overview of all of the major groups of snakes. Included are familiar species commonly kept and bred in captivity, venomous species well known for their lethal bites, but also rare and unfamiliar species which many snake enthusiasts have never seen and know little about.



For example, the Iranian spider-tailed viper, *Pseudocerastes urarachnoides*, dragon snake, *Xenodermus javanicus*, Round Island keel-scaled boa, *Casarea dussumieri*, and Kenya mountain viper, *Montatheris hindii*—species usually seen only in social media posts—are all depicted. Also included are other species that snake enthusiasts are familiar with and have seen in captivity, but are less commonly described in books about snake natural history, such as Möllendorf's ratsnakes, *Elaphe moellendorffi*, Mandarin ratsnakes, *Euprepiophis mandarinus*, and Mangshan pitvipers, *Protobothrops mangshanensis*.

Each species is given a single page, with identical format. Both common and scientific names are stated. A small table lists eight features for each species. First, the family is given. Risk factors list descriptions such as nonvenomous, venomous, mildly venomous, or highly venomous; rear fanged; harmless to humans; procoagulants, anticoagulants, hemorrhagins, hemolysins, presynaptic or postsynaptic neurotoxins, myotoxins, cytotoxins, and cardiotoxins; or venom composition unknown. The adjectives "probably," "possibly," and "potentially" are added where appropriate. Some species are described as being constrictors or powerful constrictors. Both distribution and elevation are reported. Habitats are listed, with very specific descriptors such as tropical lowland and lower montane forest with 98–180 in (2,500–4,500 mm) annual rainfall, cultivated rice paddies, coastal dunes, rocky wadis, open montane moorland, palm groves, limestone karst, bayous, rocky talus slopes, needle-leaved coniferous forests, elephant grass plains, and savannah dry woodland. Prey items are listed under diet. Reproductive data describes species as being oviparous or viviparous along with clutch size when known. Finally, ICUN and Cites conservation status are given.

A postage-stamp-sized map of the world is depicted on each page with the snake's distribution highlighted in red. Obviously with such a small world map, the home ranges are sufficient to give the reader an idea where the species is found but lack precision.

A brief, single paragraph of text accompanies each species, with descriptions of unique features, behaviors, and natural history. The text is self-described on the inside flap of the dust jacket as "written for laypeople," and gives a succinct overview. A second paragraph lists related species of snakes, including subspecies and close relatives.

The best part of the book is the photography. Each snake species is depicted by a high quality image of the whole snake with the background removed, so that the snake rests on the plain white background of the page. Most species accounts feature a second, close-up image of the head of the snake, labeled "actual size." In the majority of cases this second image is merely an enlargement of the main image, sometimes with neighboring coils cropped out. Overall the feature adds interest and allows visualization of head scales and anatomy. For a few small snake species there is only a single image of the whole animal.

O'Shea called upon his vast network of herpetological friends and colleagues, presenting them with a long list—600 in fact—of snake species for which he needed images. Well over 150 photographers responded with contributions and they all are cited in the acknowledgments on the last page. The names are listed alphabetically, which is fine for looking up which images were taken by a given photographer but requires reading through the entire list to look up an unknown photographer for a given page. Nevertheless, O'Shea and his editors had a vast portfolio from which they were able to select the highest quality photographs. Humble-brag: I think you will find the image of the Cuban Racer on page 307 to be especially compelling. While most of the images are of excellent quality, I did find that some of the cropped and enlarged headshots suffered from soft focus.

The "actual size" gimmick is interesting and unique. It allows the reader to better picture how a live specimen of an unfamiliar species might appear, but obviously has limitations. For many of the large and truly giant species, the "actual size" image would only fit a subadult specimen.

The Book of Snakes also features an introduction and some brief, basic, but informative sections on natural history. Topics include the evolution of snakes, taxonomy and relationships, basic anatomy, prey and hunting, enemies and defense, reproduc-

* Hardcover $55 and E-book $33 from University of Chicago Press; Hardcover $35.45 and E-book $33 from Amazon.

tive strategies, snakes in human cultures, and snakebite.

The back of the book includes a glossary of terms. A brief section on resources lists books covering snakes in general, field guides by continent, national and international herpetological societies, and a handful of useful web sites. Finally there are indexes of common names, scientific names, and taxonomic groups.

The Book of Snakes is well edited, and while I did not read every species account, I found no egregious factual or typographic errors. I'm not enough of a taxonomist to comment on the accuracy of the scientific names O'Shea used, but the ones I know seemed to be current. The one minor, inconsequential error I can cite is under the Borneo short-tailed python, *Python breitensteini*, account. O'Shea reports the new related species *P. kyaiktiyo* as being described from Thailand when in fact the only reported specimen came from Myanmar.

The Book of Snakes is a companion volume to Tim Halliday's 2015 *The Book of Frogs: A Life-Size Guide to Six Hundred Species from around the World*. O'Shea's book follows the same format as Halliday's, including using 600 species, reproducing images in the actual size of the depicted species, and having 656 pages. However, O'Shea's book, with the head shots, has almost twice as many images as Halliday's does. The two books would fit nicely together side by side on a bookshelf.

The Book of Snakes is relatively inexpensive considering its size and number of photographs. O'Shea's style here is to present brief information about a wide range of snake species, rather than detailed information about snakes in general or a few snakes in particular as might be found in a herpetology textbook. Nevertheless, for the casual reader and general audience this is a pleasing balance. Snake lovers will enjoy this book for the many photographs and the wide spectrum of depicted species, many of which will be unfamiliar.

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Minutes of the CHS Board Meeting, November 16, 2018

Rich Crowley called the meeting to order at 7:42 P.M. Board members Dan Bavirsha, Lawrence Huddleston, Zac Oomens and Jessica Wadleigh were absent. Minutes of the October 19 board meeting were read, corrected and accepted.

Officers' Reports

Treasurer: John Archer presented the October financial reports.

Media secretary: Kim Klisiak reported that the new Junior Herpers site is live. Kim will be sending out an email to Junior Herper members/families to get feedback. The new ReptileFest site is about halfway done.

Membership secretary: Mike Dloogatch read the list of expiring memberships. Absentee ballots were sent out in the October Bulletins. Names of two additional candidates for member-at-large will be added to the CHS Facebook page and website.

Sergeant-at-arms: Mike Scott reported 25 in attendance at the October 31 general meeting. Mike said that the highest count for the year was 42 at the February meeting.

Committee Reports

ReptileFest: Frank Sladek reported that we have renewed our contract with Eventbrite, and he hopes to take advantage of more of its features this time. Advertising flyers for ReptileFest 2019 are now available. Some data from Eventbrite about this past 'Fest: more than one-third of all tickets were puchased through Eventbrite; 58% came from Chicago proper; 78% were first-time attendees; 41% found out about ReptileFest from family/friends; under "coming to see" 17% said snakes, 16% said alligators and crocodiles; under "reasons for attending" 31% said to spend time with family and friends, 24% said to hold animals.

Junior Herpers: James Krause spoke at the November meeting, which was attended by roughly 40 people. Lalainya Goldsberry will speak on brumation at the December meeting.

Old Business

PIJAC conference: Rich Crowley attended a conference held by PIJAC in Washington, D.C. A lot of interest was shown in the CHS, particularly in the Junior Herpers group.

Chicago Wilderness: Consensus of the board was to renew our annual membership in Chicago Wilderness.

The meeting adjourned at 10:15 P.M.

Respectfully submitted by recording secretary Gail Oomens

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What You Missed at the November Meeting: Maggie Solum

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Maggie Solum likes crocodilians. As with many of us, she likes most animals, but she really likes snakes and crocodilians, particularly alligators. So she set out to work with the animals she really likes. Getting a job as a zoo keeper is much more difficult now than it was when I was young, but two years ago Maggie managed to secure a position at the Fort Worth Zoo. The biography on our web site describes a little of her efforts to achieve that end.

> Maggie started out at Serpent Safari Reptile Zoo in 2007 as a tour guide, followed closely by the Wildlife Discovery Center in Lake Forest in 2009. Juggling both facilities for almost 7 years while finishing her Bachelor's in Biology at Elmhurst College and interning at local zoos. In June 2016 she accepted a job at the Fort Worth Zoo in Texas as a Terrestrial Ectotherms keeper – or a herp keeper. Her focus is crocodiles and venomous snakes while also managing the invertebrate collection at the zoo.

Maggie Solum. Photograph by Dick Buchholz.

She's now working with crocodilians at the Fort Worth Zoo and occasionally drives to Houston to work at Crocodile Encounters. This woman really loves to work with crocodilians. She was nice enough to leave the warmth of Fort Worth to visit us in November, and she gave a fun and informative presentation titled "Crocodilian Cognition and Learning."

We learned that crocodilians appeared about 84 million years ago, are close relatives of birds, and have roughly 24 species extant (depending on which taxonomy one accepts). Unlike most reptiles they are social, vocal, have very unique parenting behaviors, and have long life spans. They have color and binocular vision, good depth perception, and a nictitating membrane which, Maggie says, studies show does not act as a corrective lens for underwater vision but probably simply protects the eyes from debris. Indeed, the animals have relatively poor underwater eyesight, unlike their hearing which is equally good in or out of the water. Gular pumping aids their smelling abilities, which might be developed while still in the egg. Little is known about the sense of smell underwater. Perhaps the neatest sensory organs that all crocodilians have are the integumentary sense organs, usually referred to as ISOs for obvious reasons. Alligators and caimans have these on their heads and the rest of the crocodilians have them all over their bodies. They appear to sense pressure changes in the water and may also sense water temperature or even electrical fields of potential prey.

Maggie moved into her favorite area, animal behavior. She claims she isn't science minded but she loves animal behavior. Crocodilians have the largest brain of any reptile, and while much of it is devoted to bite force, facial sensations, and food manipulation, there is enough left over to allow crocs to be easily trained, manipulate tools, and engage in play behavior. She related some rules of training any animal, including never setting up the animal to fail. One should try to decide if the animal's natural behaviors might lead to particular skills you'd like to impart. Then isolate that behavior, use the proper motivation, and practice the behavior with the animal. Maggie told of how quickly she managed to change the behavior of the Fort Worth Zoo's dwarf crocodile, Ruby, from an aggressive approach for food to an approach-and-wait behavior. She said that it made for a much safer feeding experience for her. Slapping or other sounds are associated with particular individuals and the individuals recognize and respond only to their particular stimulus.

Natural history of the animals should also be taken into

Frequently zoo visitors claim the animals are fakes because they don't move and have no throat. Maggie tries to correct them, but sometimes just gives up. Photograph by Maggie Solum.

The Fort Worth Zoo's saltwater crocodile, Errel. Maggie says they have "no direct contact with him because you would die." Photograph by Maggie Solum.

Maggie has trained this dwarf crocodile to wait patiently for its food. Photograph by Maggie Solum.

account with regard to housing, enclosure furnishings, foods and methods and times of feeding. Attempting to recreate crocs' natural habitats and behaviors leads to happier and healthier animals. She showed photos of the Fort Worth Zoo's gharial enclosure and Crocodile Encounters outdoor and indoor housing. As much as I can tell from the photos, all the crocodilians looked happy.

Through anecdotes, Maggie illustrated many of her points. She tells of the time she saw and felt a crocodile slam its head against an overhead beam hard enough to cause the beam to shake and show no signs of being hurt. Her dwarf crocodile will sit on the bottom of its tank with its mouth open (apparently a common behavior), looking like a croc model, when suddenly it will seize an inattentive fish swimming by. This same croc killed the two other crocs it was paired with, leading Maggie to comment that they'd like to try and breed her, but the zoo is not sure it's safe to attempt. We saw video of the zoo's 26-year-old, heavier than 1200 pounds, saltwater croc getting its first full carcass. An impressive display of strength ripping the carcass to pieces. This same croc gently nuzzled a watermelon that was offered to it, pushing it around but never eating it.

Maggie finished her presentation with areas she would like to explore more. She'd like to see more studies on sleep, possible counting abilities, more use of wild observations for captive care decisions, and training tolerance for medical procedures. It's obvious that there is much more to learn about these fascinating animals. Thanks to people such as Maggie, crocodilians will be studied and better conserved and the public will be better educated about how neat crocodilians are. Maggie delivered a humorous and knowledgeable talk. Go visit her at the Fort Worth Zoo if you're in the area. Their reptile house really is nice. So is she.

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Miscellaneous Herpetological Flandickery

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The CRHSD Listserv and E-mail Armageddon

There was a time when if one wished to host a scientific symposium, resplendent with big-name speakers addressing specific audiences, one would have to resort to such primitive methods as phone calls, or letters of invitation placed in carefully addressed envelopes, sealed, stamped, and deposited in the mail. If done correctly, one would also include a smaller stamped and addressed envelope inside the first envelope for a reply from the person invited. That wasn't all that long ago. The last time I saw it done this way was in 1998. I was privileged to see Brian Sullivan, Gordon Schuett, and Mike Demlong operate in this fashion when they created the very first Current Research on the Herpetofauna of the Sonoran Desert Symposium (CRHSD). (I wish they had named it something else. The way I have memorized the pronunciation of the acronym CRHSD is to think of the sound made when one is hawking up a glob of throat phlegm). Anyway, they organized this very first CRHSD by using the phone call and mailed invitations approach. Classy! The only reason I know that they did it this way is because I was invited, and subsequently, attended and presented. While I had presented to various herpetological societies, schools and civic organizations, CRHSD was my first ever scientific symposium. It was big juju to me at the time, and I remember being quite nervous when I stepped up to the microphone. But in the end, it was by far the most rewarding and enjoyable experience in my life. And the CRHSD was basically the first time *ever* such a group had been assembled to discuss the herpetological work being done exclusively in the Sonoran Desert. The list of people who presented included more heavy hitters than the 2016 Chicago Cubs. I proudly display a framed photo from that event. It is a picture of me in the center, with Gordon Schuett to my right, and Roger Conant to my left. We were chatting at a table when my friend Jack O'Liele snapped the pic, which he later framed for me.

So successful was this first CRHSD, it was decided at the end of it that the tradition would continue on a regular basis. It would become a biannual event. The first one was held in April 1999, which would make April of 2001 the likely date for the next one to happen. Herpers being what they are, and who they are, as April 2001 neared there had been much talk of doing another, but nobody—and I mean ***nobody***—was willing to step up and say "I will do it." At a board meeting of the Tucson Herpetological Society (THS), yet another round of "we should do this thing" came up. I told everybody that I was tired of their

minutia. They were all a bunch of procrastinators, and then, well . . . I said the fateful words: "I will run it. Who is going to help me?" I fully expected to be immediately cut down in my tracks, but Dave Hardy Sr. said "I will help you, Roger." Our Webmaster at the time, Bill Savary, also jumped right in there and said he would do anything we asked of him. And all of a sudden, we had an army—and a damn good army at that. The second CRHSD was held in April of 2002, and was declared "as good as any other major herpetological symposia" by the 200 or so people who attended. Lest anybody think that I'm bragging, I should be quick to add that CRHSD 2 wasn't good because of me, but in spite of me. The planning committee was awesome, and a great testimony to what a herp society can accomplish when properly motivated.

One of the early decisions was to skip the snail mail thing. We would use e-mail and our website as the proper tools to get the word out. As I already had gathered e-mail addresses for over 200 people, it was only natural that I be the trigger man on the inaugural e-mail to announce it all. We held a special meeting just to gather *more* e-mail addresses, and in time, the list grew to over 500 people. At that time, the only access to e-mail that I had was at my job, which was monitored by those whom I worked for. While National Optical Astronomy Observatory (NOAO) was lenient with personal e-mail for any scientific purpose—including herpetology—I surmised that flipping a message to 500 people off the NOAO system *might* earn me a less-than-cordial visit to the Human Resources Department.

It was in the process of meeting with the CRHSD 2 crew that I first learned of this thing called a "Listserv." We shall call the guy who suggested that we use this here Listserv thing "Joe," as that is his name. And before I go any further, I must highlight that I do not blame Joe for what happened next. He was trying to help, and in the process, we both learned together the true meaning of the words "No good deed goes unpunished." Joe was a tech in the computer department of the University of Arizona at the time, and he assured me that he would open a Listserv account for us under the name of "CRHSD." He promised to have it up and running by the following week. I would know it was ready when he sent out a test message. We had already prepared a warm, thorough introductory letter that would be ready to fly once it was proven that the Listserv worked correctly.

Thus it came to pass that I received an e-mail from Joe with the subject matter "Welcome to the CRHSD Listserv." I was surprised to see that in the subject box. I was thinking more along the lines of something like "Test message—Please ignore" in said subject box. But rather than that, 500 people received "Welcome to the CRHSD Listserv." I could visualize 500 people, most of whom were ignorant of what the hell CRHSD was, getting this message and saying "Humph! What the hell does CRHSD mean?" (involuntarily hawking up a clam in the process). When I opened the e-mail and got into the text, there was a brief message from Joe. It said: "Roger, did you get this? Joe." Following Joe's brief message was two pages of ponderous legalese, suggesting various thou shalts and thou shalt nots pertaining to using the Listserv address. Then, it ended with "Roger A. Repp, Committee Chair, CRHSD."

There was not a single sentence in there about the upcoming symposium or what CRHSD stood for; nothing but endless rules and regulations for using the Listserv, signed off by me. But wait! It gets *better*! For what came next, it is necessary to backtrack and explain a little something. Back then, whenever an e-mail entered my inbox, it made a sound to alert me that I had just received an e-mail. I had my choice of which sound the incoming missives would make, and I chose the sound of a bullet ricochet. I've always loved the sound of a chunk of lead careening off a boulder while traveling at a thousand feet per second. "Bee—YOUUUUU," right? Now we can move forward with this story. We had not only sent an ill-conceived and poorly executed mass e-mail to over 500 people all over the world, we had created an ***effing chat channel***! FIVE HUNDRED PEOPLE, many of whom were the top herpetologists from around the globe, could now witlessly fire angry words at will. Their words would not only go to those responsible for the misdeed, but cross cyberspace in 500 directions at once, spanning oceans and continents to smack innocents upside the head as well. Really, some of you herpetological hotshots out there in e-mail land might consider toning your language down just a tad. Those words *could* be used against you! Just ask Hillary Clinton, or more recently, Ivanka Trump.

"Bee—YOUUUUU!" came the first message. It was rather mild. "I don't know who Joe is, but yes, Joe, I got the message. Who's Roger? What's up?" And then . . . *there was fire in the hole*! "Bee—YOUUUUU!" "**WTF!**" (Only it was spelled out. That's right—he used the foo foo word on the internet!) "Bee—YOUUUUU!" "**WTF!** (The foo foo word *again*! This time, from a woman.) "Bee—YOUUUUU!" "Bee—YOUUUUU!" "Bee—YOUUUUU!" My office was filled with sounds not unlike a typical mass shooting as message after message came firing in. I was on the phone seconds later, and thankfully, reached Joe on the first ring. "Shut it down Joe!" But Joe couldn't hear me. Joe was a video game nut, and his computer was roaring out the sound of a particularly vicious game of PacMan. Joe next uttered the universal phrase that comes from those not hearing a verbal message: "What did you say?" "***I SAID SHUT THE EFFING LISTSERVER DOWN NOW***!" (Now, *I* was using the foo foo word!) I don't think he needed the phone to hear that statement, as it carried through the walls of my building, traveled two blocks down the road to his building, and permeated the walls there. "***Right! Gotcha!***" To his credit, the CRHSD Listserv was shut down less than a half-hour later. But *what* a half hour that was. "Bee—YOUUUUU!" "Bee—YOUUUUU!" "Bee—YOUUUUU!" "Bee—YOUUUUU!" and my boss comes storming into my office. "Those better be work-related e-mails that I'm hearing!" Said he. "Oh yeah, boss—right! You have *no idea* how slammed I am today. Please state your business, and get out. Can't you see I'm busy?" "Busy my ass! Whatever is going on, knock it off, and ***get to work***!" And then he stormed back out of my office, shaking his head and muttering. I spent the next three nights sending e-mails of apology to those who were quick enough to get their e-mailed bitching in before it was all shut down. The most interesting e-mail to cross my path was from a professor in not-so-jolly-old England, who told me in no uncertain terms to take him off that bloody list, what a bloody nuisance this e-mail stuff was, how he was so busy that he did-

n't have time to pick his bloody nose (no doubt the cause of his nosebleeds), and how all this idiotic e-mail crap was impinging on his ability to get *anything* done. He went on to write two more paragraphs stating how busy he was, clearly indicating that he wasn't all that busy in the first place. But in the end, everybody, including the gentle professor from Cambridge, was extremely understanding about the mistake after they received the apology. Herpers really are an understanding and forgiving breed of people. That was part of what I learned here.

I also learned two other things from this. Number 1: Envelopes and phones might not be such a bad idea after all, and Number 2: If you're going to screw up, make it count! The latter statement segues nicely into Round 2 of this Miscellaneous Herpetological Flandickery column, which is entitled:

Winged Wenches from Hell

My father was on old school barber by profession. This meant my haircuts, of which there were *many*, were always free. In the late 1960s, when I was in high school, it had become the trend for the younger generation to let their hair grow as a symbol of rebellion against, well, everything. *Everybody* was sporting long hair! That is, everybody but me. I was "the example" of how, in my father's estimation, the youth of my generation *should* look. Right down to the nub went my hair, once a week. Yup! Not only was I the only teenager at Crystal Lake Community High School sporting *ridiculously* short hair, but *acne vulgaris* also ran rampant across my homely visage. And while the school system had abolished the dress code, my father had *not*! For many people, their fondest of life's memories come from their high school years. Me? I stand ready to deck the first of my former schoolmates to call me "Butch," or "pizza face." I have yet to attend a single high school reunion, lest some smartass come up to me and say "Is that Butch? Nice hair! Whatever happened to your zits?"

In conjunction with dad's barber shop was a toy and hobby store, which he also owned and operated. I worked there from the time I was four years old until my junior year of high school. This allowed my father easy access to my head. If business was slow, he'd hook me and say "Time for a haircut, son. Get in the chair!" The older I got, the more I fussed about it, but resistance was futile. The slightest outburst on my part would bring about the standard lecture about who paid the mortgage, electricity bills, doctor bills, who bought the food that I ate, and who basically not only owned my head, but my ass as well. It was best to not remonstrate at all, because until I moved out of the house (at 18 years of age), I really had no say in how my hair should look.

Dad had a rather tiny barber shop cordoned off from the rest of the toy and hobby store. The barber shop was roughly 12 feet wide by 16 feet long. A barber chair sat in the center, two waiting chairs to the right of the chair. There was a sink behind the barber chair, and counters that held his scissors, razors, combs and sundry other tools of his trade. A TV was strategically placed in front of the chair, so both he and his customers could watch whatever was on. If a baseball game of any sort was being broadcast, it was on. This was especially true if the Cubs were playing. Every wall inside the room was occupied with such things as pictures of his family, beer cans from around the world, baseball teams that he sponsored or coached, Cubs paraphernalia and newspaper headline clippings, impressive pre-World War 2 metal trains resplendent with a full complement of box cars and cabooses, and various other odds and ends that held special meaning to him. Calling it cluttered would not be unfair, but it was all carefully organized clutter. Right above the TV hung a framed poem, which was impossible not to notice. It read thusly:

> The bee, she is a busy soul
> She has no time for birth control
> That is why in times like these
> There are so *many* sons of bees
> —Anonymous

I have exhausted all searches on the matter of who wrote this clever little poem. Since nobody seems to want claim it, may I? I will call it "Winged Wenches From Hell, and *Stupid* SOBs," by Roger A. Repp. In any case, growing up and seeing this poem so many times, I should have made the connection that it was a warning sign of sorts. It is interesting to note that between the time my father hung that poem and I learned to read, a storm of sorts had been unleashed. And both the storm and I were on convergent paths that would lead us to Arizona. Until just recently, I never knew the history of how this Africanized (killer) bee crisis came to pass. A quick Googling of "history of killer bees" scored a direct hit on a boatload of information from Wikipedia. That is my source for the information in the next paragraph.

Back in 1956, an apiarist by the name of Warwick E. Kerr imported some queen bees from hives in Africa. He brought them to Brazil, where he began his experiment. He was trying to increase the honey production of the European honeybees that he kept. He established 27 hives by cross-breeding these African queens with those he was keeping. He already knew the African variety was far more aggressive than its European counterparts, so he quarantined these 27 hives. He devised a clever method of utilizing specialized screening over the entrance/exits of each hive to do this. The openings in the screens were of such a size that the worker bees could pass freely in and out of the hive, but small enough that the drones and queens could not escape. A perfect plan—what *could* go wrong? And here is where "If you're going to screw up, make it count" comes into play. In 1957, a visiting apiarist (the stupid son of a bee is un-named by Wikipedia) noted that the screens were impeding the progress of worker bees going in and out. In a brazen act of befuddling incompetence, he removed the screens. And blam! 26 hives flew the coop, and began to steadily march northward. Exactly when they first showed up in Arizona is unclear, but by 1994, 15% of all wild hives were of the killer bee variety. By 1997, that number skyrocketed to 90%! Since their escape, it is estimated that over 1,000 people have been stung to death, not to mention an undeterminable number of dogs, horses, and cattle. (*Can you imagine how horrible it would be to die this way? I sure can! And as careful as we are, dying in this fashion is a very real possibility for those of us who study our crawly friends*).

I was terrified of bees long before the Africanized version made their appearance. In Arizona, honeybees colonize the

exact same sorts of places that denning Sonoran Desert Tortoises (*Gopherus morafkai*), several species of rattlesnakes, and Gila Monsters (*Heloderma suspectum*) also relish. Even before the Africanized version arrived, I was, at times, being harassed by the European variety. But they never really attacked, and rarely did they do *anything* like I'm seeing today. In 1989, I presented before the THS, and made a big deal out of one landing on my pants and wandering about the vicinity of favored body parts. My efforts to swat it dead were successful, but the resulting pain was impressive in both magnitude and duration. These days, every trip I make to the hillsides seeking our crawly friends has at least one incident of the winged hellions bouncing off my forehead, or trying to land in my eyebrows. That is always the first sign that it is time to back off—which I do without fail every time it happens. So, okay, I've just admitted that this big wussy here is afraid of bees. Why? Because they kill people, dogs, horses and cattle. While it has yet to be proven that this author is classified as "people," there is strong evidence suggesting that I am one of those. According to Wikipedia, that earns me the privilege of being among 25% of the creatures on the killer bee's hit list. More deep thinking about Wikipedia's killer bee hit list quickly led me to believe that more creatures than listed are probably on it. It did not take this one-track mind long to ask "what about reptiles? Do the nasty little sky vermin attack *them* as well?"

Back in March of 2005, I was blessed to witness a bit of an interaction between a tortoise and a burrow full of bees. The tortoise, a large adult female, was on the move, ambling along and selectively grazing on some flowers in her path. I tried following her from a short distance away with camera in hand, hoping to get images of her browsing. But she noticed me, and began to amble away from me at a fairly brisk clip. She headed straight for what at first appeared to be the perfect tortoise burrow. As we both drew closer, her leading the charge, I noted that this burrow was packed with honeycombs, and had bees entering and exiting at a rate of about a dozen per second. Undaunted, she continued her rapid approach to the burrow. When she was approximately a meter away from entering the hole, the bees began to take great interest in her. I'm estimating that 50 bees began circling very close to her, with the majority of them focusing on her head area. As soon as that happened, she covered her eyes with her heavily armored forearms. The act was not a complete sealing action, where the head is drawn completely in and the limbs encapsulate it. Rather, the centers of her forearms were drawn close to each eye, acting as a shield for each, while her front feet were still touching the ground. She used these to lift herself upward, while the rear legs propelled her forward. She angled upward, kicked with her rear legs, and plopped forward until such time as she entered the actual bee cave itself. While the last meter of open ground was navigated in such fashion, the bees continued to encircle her head, and several landed on each forearm. They were obviously trying to sting her, but not having any luck with penetration. As she entered the hole, her bulky frame plowed through the lowermost tips of the stalactite-like honeycombs. This brought a larger swarm outside of the burrow, and these started to zero in on the hindquarters, 30 or so of them bouncing off the rear of her carapace. While this was happening, she gave one last surge and flopped in, the rear of her carapace barely flush with the burrow opening as she hit a dead end. Only then did she seal herself in the manner those familiar with turtles and tortoises have seen countless times. While it appeared to this observer that she recognized the danger of the bees, she seemed more afraid of me than them. Also, the bees were completely ignoring me, even though I was only standing about 20 feet away. Once she clamped up and settled in to the burrow, the bees calmed down almost immediately. I tried to sneak forward to get a picture of the situation, but within an instant, I heard the high pitch whine of guard bees, and three of them began bouncing off my forehead. It was time to run away. The guarding of the eyes reaction on the part of the tortoise is what interests me the most with this observation. Is that a learned behavior, or something they are hard-wired to do? The world may never know!

In the years that have followed this incident, I have found the carcasses of four other tortoises stuffed inside active bee caves. Maybe they didn't know to cover their eyes? The opportunity to present a smoking gun here—actually witnessing the bees mobbing and stinging a tortoise to death—has yet to present itself. But these four corpses, coupled with the event just described, do seem to suggest there is at least a possibility that tortoises are on the killer bee hit list.

With this in mind, your author sought the input of others. He went to seven other experts on wild tortoises, all of whom he has worked closely with through the years. He asked one basic question of them: "Have you ever seen killer bees attack tortoises?" Their answers all focused on the fact that they had seen bees and tortoises together, but *never* saw any signs bee-to-tortoise aggression. All their answers also described themselves being chased away from the burrows (*always* a memorable experience), but nothing along the lines of what has just been discussed above. Of course, *now* they want me to write a peer-reviewed article about it, and maybe that day will come. For now, my peers are reviewing it, and the reader can feel free to say "I saw it *here* first."

They are not the only reptile to face the threat. I was originally going to stop with the tortoises, as I thought what I was going to suggest next was based on even flimsier evidence than what was just described with them. But then, I did a web search, using only the question "Do killer bees attack reptiles?" to see if anything popped up. It did! And what popped up was a *horrible* four-minute video that showed a swarm of killer bees mobbing a Burmese Python. The snake isn't doing *squat*! It is sitting coiled, its eyes clouded in pre-ecdysis blue. It is coiled in the hollow of a tree stump, while the bees are occupying some of the greenery above it. Then, the murderous little swine begin to flit downward and land on the snake, which again, reacts not at all to the threat. Then, the bees start to sting it. The snake flinches in reaction to each sting. Pretty soon, the snake is flinching a *lot*, and the bees begin to gather in numbers. They are gathered in globs against the flanks of the hapless snake, and beginning to move in on its clouded eyes. Mercifully, the film is cut short before the inevitable happens. It leaves me wondering how far the event actually went, but grateful that this is all I saw. Whether staged, or not, the film addresses where I at first wasn't going to go.

Figure 1. Dead Western Diamond-backed Rattlesnake (*Crotalus atrox*), in situ, as found in front of a bee cave/overwintering aggregate den site. Note the detached rattle to the lower left. The author speculates that this snake was mobbed and killed by Africanized bees. This snake, and one other that was similar in size and hollowed-out appearance, were both found at a place called Hill 97, which has the most fearsome beehives of all the places that we visit. See text for further details. Image by the author, 25 November 2017.

Figure 2. 1 November 2014. The last sighting and subsequent image of Cm12. He was a dandy of a Black-tailed Rattlesnake (*Crotalus molossus*) who was part of the Suizo Mountain Study. The year 2014 was a banner year for this snake, whom we named "Jerry" after Marty Feldner's father. Jerry was viewed on several occasions throughout the course of 2014 with massive food boluses extending his already massive flanks. His posture is rather atypical. It appears to be defensive, but he is actually in a hunting posture. As the image shows, this snake is the picture of health, and we expected great things from him in 2015. See Figure 3 for more. Image by Martin J. Feldner.

I have twice observed adult male Western Diamond-backed Rattlesnakes (*Crotalus atrox*) dead of no obvious cause just outside their overwintering sites. In both cases, they had selected highly active bee caves to overwinter in. One of the dead *atrox* was observed approximately a meter up in a palo verde tree. He was strung out lengthwise in the tree, his tail nearly touching the ground. This location would have put it directly into the flyway path of incoming and outgoing bees. This hive is *so* active that at times, there can be as many as 50 a second going out and coming in. It is a terrifying place to visit, but I always brave it anyhow. It is a common sight during the fall and winter to view as many as five *atrox* in the lower recesses of this massive cave, while the bees zip in and out seemingly oblivious to their presence. As rattlesnakes will often climb in the face of danger, it is entirely possible that the bees mobbed this particular *atrox* on the ground first, and he climbed into the tree to try to escape them. The second *atrox* to possibly fall to the winged wenches is shown in Figure 1. It occurred on the same hillside as the above incident, at another entrance that likely leads to that same bee cave. One of the four dead tortoises mentioned earlier is deep inside the opening close to where the second dead *atrox* was found. This tortoise was a big guy, who had returned to this den for many years. And now, he has remained inside that cave for many more. In both cases with the *atrox*, the dead snakes did not have a visible mark on them, but appear hollowed out. Could that be the work of bee venom? The demise of both these snakes is highly speculative, but in light of the subject matter, and the revelation of the python being mobbed and stung, the matter is certainly worth mentioning.

During the Suizo Mountain radio-telemetry study, one of our largest male Black-tailed Rattlesnakes (*Crotalus molossus*) entered an active bee cave on 22 November 2014. He was last seen and photographed on 1 November, and appeared to in good health when he entered. He never came back out. We don't know what happened to him, except to say that outwardly, he sure seemed to have a lot of life left in him! It is my opinion that the bees got him. See Figures 2 and 3.

Figure 3. (Left) Jerry entered his overwintering site just prior to 22 November, likely utilizing the crevice in this image as his entrance. While this image seems to be a harmless cleft in the rock, during the active flowering season, swarms of bees utilize it as their entrance and exit hole. (Right) This is what the hive looks like three meters above the entrance hole in the image to the left. The author chose a very cold morning to get these two images, as it would not be advisable to try such a thing on an active day. Once Jerry entered this site, he never came out again. Images by the author.

People sometimes make fun of me dressing in full camouflage when I go out herping. There are more advantages than bee avoidance in dressing like this. But if giving oneself an edge in concealment from the eyes of the pernicious little pests were the *only* reason to dress in this fashion, it is reason enough. Since adopting this strategy, I get stung far less than most who venture out in their fire engine red shirts, or even worse, hairy, stinky people who dress in black. These fine folk usually suffer much verbal abuse from me from the minute they step into the vehicle until they finally step out at the end of the day. More times than not, I am the person leading the field trip—the guide. If I do my job right, I explain something to the group about killer bees. I assure them that if they are being attacked by a mountain lion, or a bear, or anything else, it's on! I'll come in swinging my walking staff, loudly cussing, and help in any way that I can. But if they are being mobbed by killer bees, my approach to that will always be "none for all and one for one!" I have been with other people who have been chased and merrily stung by several guard bees, and without fail—they always run *toward* me, making a plea for help. They see my rapidly retreating back every time, and if they get close enough, they get shoved away with a firm "get the hell outta here." There is *nothing* anybody can do to help you in this situation. You *must* run away, and keep running. That is your only defense. I also try to remember to serve a warning to others about what happens if ***I*** am the one being attacked. Do not expect me to be saying anything rational. Don't listen to a word I'm saying. Just run away, and if I get close to you, run away faster. The best ever "bee-rated" horror story I've ever heard came from a husband and wife team who were herping in Mexico. She gets mobbed, and she runs toward her husband screaming "throw water on them!" He obliges by dumping his canteen over top of her, and the bees then had *two* targets to nail—twice the fun! They both survived the experience, with over 700 stings each. The short story is do *not* expect the person being attacked to be rational, and *know* that you are helpless to help. My last weapon in my line of bee defense is that on certain hillsides, I will *not* allow dogs along. This is not because I don't like dogs (which is reason enough). It is because dogs are often the cause of their masters getting stung to death. They witlessly blunder into a hive, get mobbed, and what is the first thing they do? They run to their masters for help! But the best defense of all is to know the ultimate warning sign. Before they attack in force, the guard bees will investigate you. You will recognize them by the high pitched whine that they make—much like the sound of an approaching mosquito. They usually hover in front of your eyes. If that doesn't cause your feet to go the opposite direction, they start bouncing off your forehead, or trying to land in your eyebrows or hair. At the first sign of any of these things happening, it is time to move on!

Speaking of moving on, it's time to wrap this up. In this day and age, people sue each other at the drop of the hat. Who do we get to sue for the added stress of having these angry little creatures in our lives? And the thousand or so people who have died horrible deaths—who does the next of kin get to sue about that? Talk about a justifiable cause for a lawsuit! It would be interesting to know who the idiot apiarist who cut these things loose actually was. I stopped short of trying to dig deeper to find this person's name. Brazil is long way to travel just to piss on a grave. I'm thinking he *must* be dead, and hopeful it was murder at the hands of those who employed him. I can only imagine the day that idiot walked into the office of his boss with a stack of screens under one arm. "Hey boss—look what *I* did today! I took these stupid things off our hives for you, cuz they were getting in the way of your worker bees. When do I get my raise?" Even if he was immediately disemboweled and hung by the neck, that was *still* too good for him.

Happy Holidays from Arizona

While the news may come as a bit of a shock to my Chicago brethren, we do not have a Santa Claus in Arizona. Our Santa is a Gila Monster, who goes by the name of "Gila Claws." He lives in the North Hole, and every Christmas Eve, he hops on the back of a magical Sonoran Desert Toad to deliver little packages of seeds to potential prey items. While outwardly, it appears that this is a kind act of selfless generosity, the delivery of food stuffs to the furred and feathered vermin of the desert is actually an act of pragmatism. Gila Claws is a well-read Gila Monster, whose favorite bedtime story is Hansel and Gretel. He knows that a fat mouse is fine feast, and a skinny mouse is little more than a cloacal swab. Anyhow, on Christmas morning, the greedy little snappers of the witless foul and fauna of the desert consume their gifts from Gila Claws, and in unison, raise their filthy little voices to pay homage to him. The traditional song that they sing goes like this:

(To the tune of "Santa Claus is Coming to Town." And don't just read it herpers, ***sing it***!)

You better watch out, you better just pray,
A sinister lout comes calling next May.
Gila Claws is coming to dine.

He's raiding a nest, choking down mice,
Coughing up fur balls, spitting out lice.
Gila Claws is coming to dine.

He stalks you when you're sleeping,
he smells you from on high
And when he plows into your lair
you better kiss your ass goodbye.

So, you better watch out, you better just pray
A sinister lout comes calling next May
Gila Claws is coming
(Vermin best be running)
Gila Claws is coming . . . TO DINE!

Wishing you all the finest this holiday season has to offer. May your dreams of the finest herpetological events be memorable, and may they all come true for you in 2019.

This here is Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are all above average.

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Wanted: Thank you, Linda from Cary for offering your baby leopard tortoise to me for adoption thru the CHS *Bulletin* advertisements 21 years ago! Presently "Ike" has grown into a large impressive female rompin' and stompin'thru her backyard garden/pen. Looking for a male. JimSikorski@hotmail.com, 847-566-6523.

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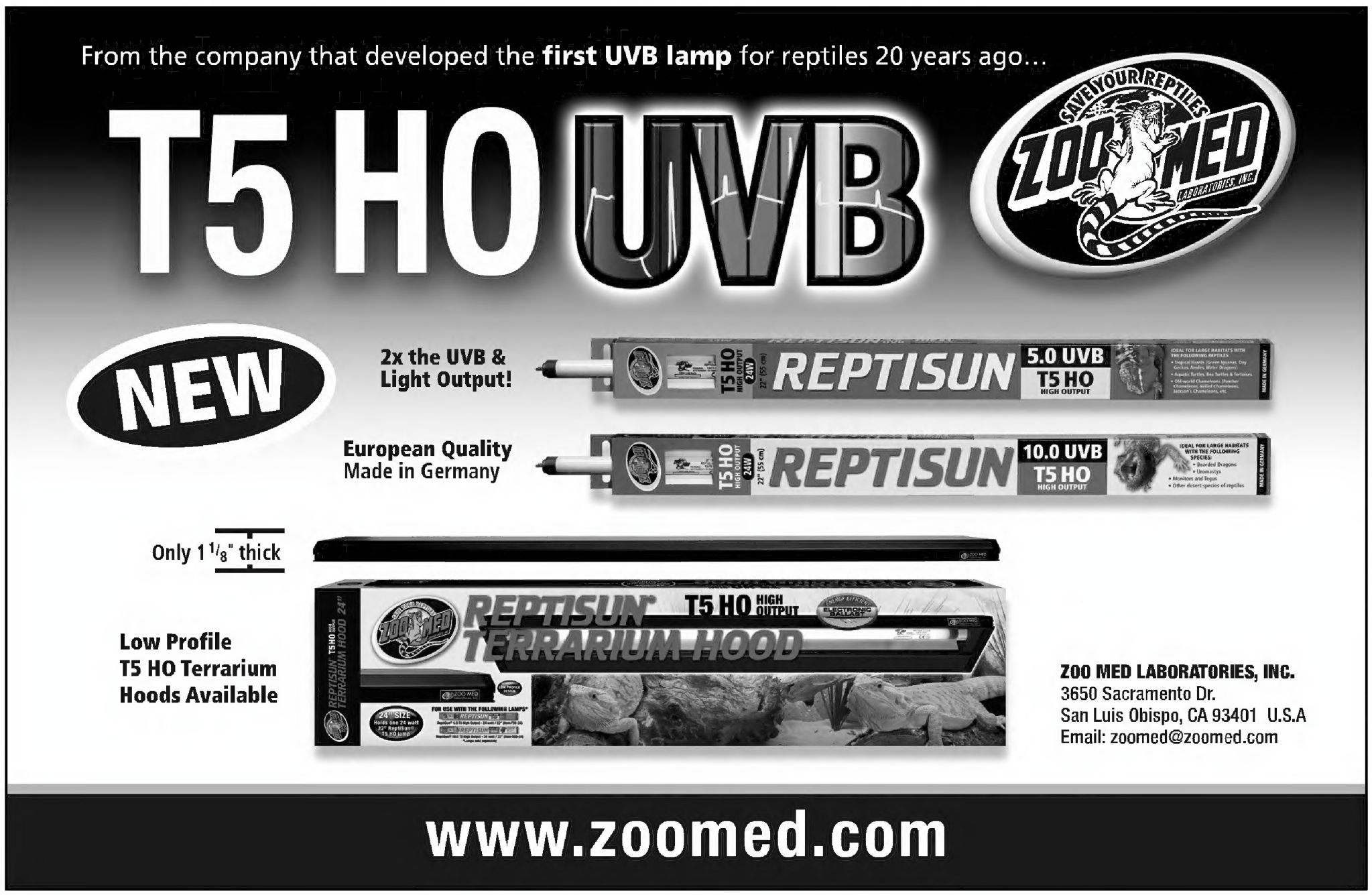
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UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, December 26, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **This meeting will be a holiday party**. The CHS will provide soft drinks and snacks. If you would like to bring something edible to share with the group, you are invited to do so. If you would like to bring an animal to show off to the group, you are encouraged to do that as well. This will be a chance to socialize all evening and get to know your fellow members a little better.

The speaker at the January 30 meeting will be **Daniel E. Keyler**, a professor of experimental and clinical pharmacology at the University of Minnesota. Dan will speak about "Snakebite Envenoming in Sri Lanka: Polyspecific Antivenom Development." Antivenoms currently distributed in Sri Lanka are prepared using venoms from non-indigenous species that are likely to differ from those of Sri Lankan snakes. In recent years Dan has used his immunotoxicology background in research toward the development of antivenom for treating snakebite victims in Sri Lanka where snakebite is a major public health problem. This has involved travel to Sri Lanka and collaboration with Costa Rica's Instituto Clodomiro Picado.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

Board of Directors Meeting

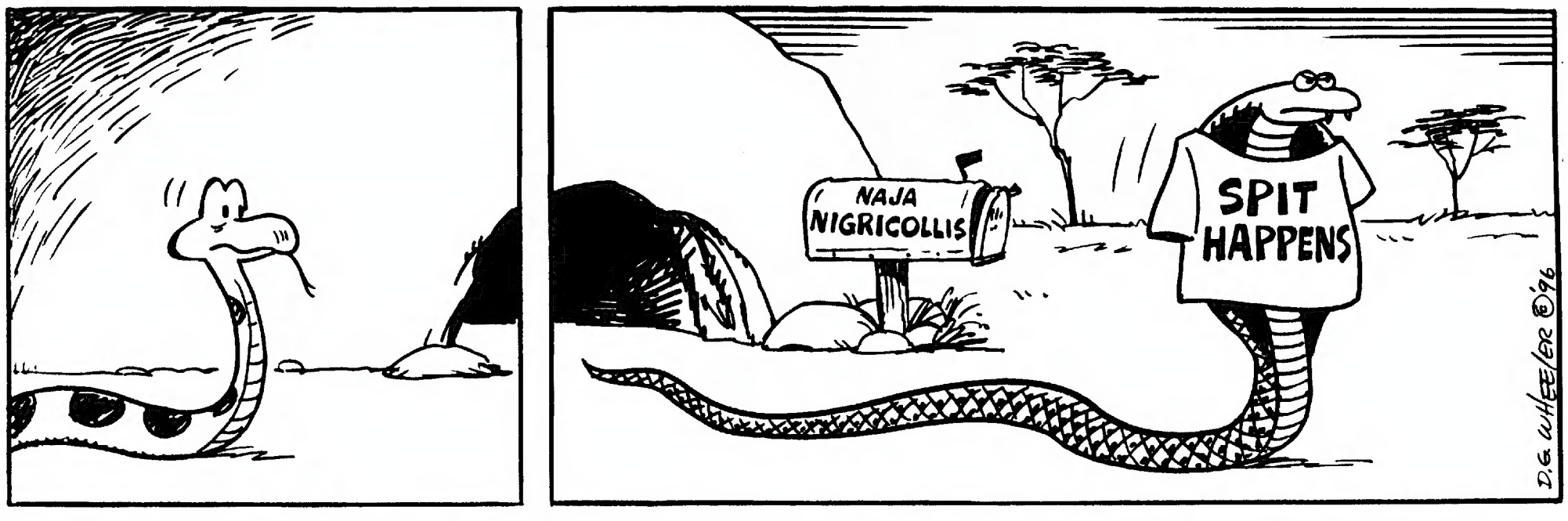
Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to take place on January 18, 2019. The venue is as yet uncertain, so if you wish to attend please email mdloogatch@chicagoherp.org.

ELECTION RESULTS

As a result of the elections held November 28, 2018, the following officers and members-at-large will serve on the CHS Board of Directors for the year 2018.

President:	Rich Crowley	Membership Secretary:	Mike Dloogatch
Vice-president:	Jessica Wadleigh	Sergeant-at-arms:	Mike Scott
Treasurer:	John Archer	Members-at-large:	Dan Bavirsha
Recording Secretary:	Gail Oomens		Tom Mikosz
Media Secretary:	Kim Klisiak		Cindy Steinle
			Sammy Velazquez

THE ADVENTURES OF SPOT



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